ZyXEL

Future Proof Next Generation Multi-Service IP Access Solution

- 768/1152 ports, 17 Vertical Slots with a Maximum Configuration of 1 MSC Card and 16 Line Cards
- Multi-service interfaces including ADSL2/2+, G.SHDSL.BIS, VDSL2 , VOIP (SIP & H.248), Fiber-based FE and E1 IMA
- 10G Ethernet Uplinks to Provide Non-blocking Network Interfaces
- Comprehensive QoS to Enhance Triple Play Users' Experience (SR, WRR)
- Field Proven IGMP v1, v2 Snooping and Proxy for IPTV Deployment (512 Multicast Groups)
- Flexible ACL, VLAN-aware DHCP and Anti-IP/MAC Address Spoofing to Prevent Malicious Attack
- DHCP Option 82 and PPPoE IA Features Support Versatile IP Address Assignment

12.5U High Capacity Multi-Service Access Node

IES-6000

Benefits

Future Proof Architecture

As the flagship of ZyXEL's MSAN product portfolio, the IES-6000 is equipped with non-blocking Gigabit backplane, failover-enabled Management Switch Cards (MSC), dual input power modules and various high-port density multi-purpose line cards. With comprehensive IP-centric firmware features, the IES-6000 is a high-capacity system that facilitates Telco/ISP to deliver high-quality residential or business user services experience at competitive CAPEX/OPEX as well as satisfying its current and future infrastructural requirements of reliability, flexibility and scalability.

Easy & Reused Logistics

The IES-6000 is a 12.5 U-height, 17-slot chassis-based multi-service access node capable of adopting the same line cards as those for IES-5005/5000 systems. The MSC1024G control card with eight 1G uplinks is designed to plug into slot 8 and/or slot 9, while the remaining slots are available for equipping various line cards. The new MSC1224G control card is with two 10G and six 1G Ethernet uplinks to support even larger bandwidth requirement. The variety of line cards are including 48-port or 72-port ADSL2+ line cards that provide subscribers with asymmetric transmission bandwidth up to 25 Mbps/2.4 Mbps; 48-port SHDSL.bis line cards with symmetric transmission bandwidth of 5.69 Mbps per port; 24-port and 48-port VDSL2 line cards that offer up profile 30a (100/100 Mbps) high-speed connectivity per port over copper wires; 48-port VoIP line card that supports either H.248 or SIP protocol, 20-port fiber-based Fast Ethernet line card that supports 100 Mbps transmission speed per port and 8-port E1 IMA card.

Advanced Triple Play and Mass Deployment Functionality

The IES-6000 inherits all the Layer 2 and Layer 3 QoS, security and multicast functionalities from the IES-5000/5005, while the following new features are added to satisfy the requirements for massive field deployments: (1) IP bridge functionality that alleviates the Layer 2 access network deployment restrictions resulted from MAC address table limitation and security attack issues; (2) ARP Proxy which minimizes the ARP broadcast requests to all subscribers; (3) TACACS+ mechanism to support remote authentication with TACACS+ servers; (4) VLAN-aware DHCP snooping which adds VLAN information into DHCP snooping tables; (5) DHCP option82 sub-option2 for providing remote client ID information to DHCP servers for flexible IP address assignment. (6) Cluster management feature that is able to reduce the OPEX of multiple MSAN maintenance.

Robust Physical Safety Design

The IES-6000 supports 1+1 MSC redundancy with a failover switch time less than 1 second. In addition, voltage, temperature and FAN speed sensors are fitted into the system. When an abnormal condition is detected, the LED displays and/or the corresponding alarms will alert administrators of the situation. In case the system temperature rises over the preset threshold, thermal cutoff protection will kick in to shut down the system automatically.

Sophisticated OAM&P Features

The IES-6000 provides various management methods: local console port, Web-based configuration, Telnet and SNMP v1/v2/v3-based EMS (NetAtlas Access EMS). The management functions include Alarm and Status Surveillance, Configuration management, Performance management and Fault management. The IES-6000 allows multiple administrative accounts with 3-level access privileges. Accounts with the first-level privilege have full access to all management objects on the Management Information Base (MIB). Second-level accounts have similar access rights except creating new administrative accounts, while the third-level accounts are granted read-only access rights to the MIB objects. NetAtlas Access EMS also provides view-based MIB management that partial MIB objects can be defined and accessed for customization and security reasons. In addition, Cluster Management enables multiple MSAN administration with single/master IP address, XML-based northbound interface is equipped to interoperate with external OSS systems.

Specifications

System Specifications

DSL Compliant

- ADSL:
  - G.992.1 Annex A, G.992.3 Annex A, G.992.5 Annex A
  - G.992.1 Annex B, G.992.3 Annex B, G.992.5 Annex B
    - Support G.992.3 and G.992.5 Spectral Mask
    - Support Annex M and Annex L in G.992.3 and G.992.5
    - Support EOC and overhead channel access
    - Support the latency path function
    - Support loop diagnostic function specified
    - Support the power management capability
    - Support the capability of the Seamless Rate Adaptation (SRA) on-line configuration
    - Single and dual end loop test
    - G.998.1 port bonding
- SHDSL: G.991.2, G.991.2.bis, G.998.1
- VDSL2: G.993.2, G.994.1, G.997.1

ATM Traffic Management

- Support 8 PVC per DSL port
- Support UBR, CBR, rt-VBR, nrt-VBR, QoS Mechanisms
- Support ATM Forum TM 4.0 peak cell rate traffic parameter
- Support downstream traffic shaping function per ATM PVC
- Support ATM F5 OAM cells for End-to-End Loop back test (ITU-T Rec. I.610)

Performance

- Eight queues with packet priority scheduling (SPQ, WRR)
- Support 512 IGMP multicast groups
- The maximum channel zapping processing time is 250 ms
- DSCP to 802.1p mapping

Security

- Per Port and Per VLAN isolation
- IEEE 802.1x (authentication)
- Rule-based packet filtering (L2 ~ L4 ACL)
- MAC count limiting
- ARP broadcast filtering
- DHCP broadcast filtering
- VLAN aware DHCP snooping
- NetBiOS filtering
- IGMP filtering
- Anti IP/MAC address spoofing
- Support TACACS+ remote authentication

VLAN

- 4094 IEEE 802.1Q compliant VLAN tagging
- VLAN stacking (Q-in-Q)
- VLAN bridge function (multiple PVCs to one VLAN)(N:1)
- PVC and VLAN one to one mapping (1:1)
- VLAN trunking (single PVC join multiple VLAN)(1:N)
- Support GVRP function

Traffic Management

- Bandwidth control and broadcast/multicast/unknown unicast control on Gigabit Ethernet ports
- RSTP: IEEE 802.1d, IEEE 802.1w, IEEE 802.1s
- IP Bridge
- IEEE 802.3ad (Link aggregation control protocol)
- IP multicast forwarding
- IGMP v1, v2, v3 snooping/proxy
- IGMP multicasting channel limiting
- VLAN aware DHCP snooping
- DHCP relay option 82 with sub-option 1 & 2
- TR-101 compliant PPPoE intermediate agent
- Multicast bandwidth control
- L2 ~ L4 ACL
- IGMP group count/filtering profile

VoIP Features

- Codes: G.711, G.726, G.729a/b, G.723.1
- Network signaling protocols: ITU-T H.248 v2, SIP v2 (RFC3261)
- RTP (RFC 1889)
- RTCP (RFC 1890)
- FAX/Modem pass through (T.38) via RTP
- Tone detection and generation (bi-directional)- RFC2833 RTP Payload for DTMF
- Echo cancellation and auto gain control (G.165, G.168)
- VAD (Voice Activity Detection)
- CNG (Comfort Noise Generation)
- Caller ID generation and detection
- Supplementary services
- Local dial available
- Emergency call local route
- Do not disturb
- Selective/anonymous call rejection
- Call waiting
- Call transfer (blind and attended transfer)
- Call return and call back on busy
- Off hook warning tone

Network Management

- Local management through a craft terminal
- Web-based management interface
- Cluster management (up to 8 cluster members)
- View-based network management
- Support XML-based North Bound Interface NetAtlas Access EMS
- In-band and out-of-band IP interface for management (SSH, SFTP)
- SNMP management (through ZyXEL NetAtlas Access EMS)
  - SNMPv1/v2c/v3 agent/traps
  - Standard MIBs
    - RFC 1213 MIB II
    - ADSL line MIB (RFC2662)/extension line MIB (RFC 3440)
    - SHDSL line MIB (RFC 3276)
    - VDSL line MIB (RF3728)
    - Bridge MIB/extension MIB
    - RMON MIB (RFC 1757)
  - Vendor specific MIBs, e.g.,
    - Chassis management MIB (fan speed, voltage, temperature)

Hardware Specifications

IES-6000M

- 17-slot rack mountable enclosure, 19" or 23" chassis
- Maximum 16 slots for DSL line cards (slot 1 ~ 7, 8 or 9, 10 ~ 17)
- 2 slots for management and switch cards (slot 8 & 9)
- 2 DC power input module and filter
- One FAN and dust filter module
- One alarm module

ALC1248G-51/ALC1272G-51

- Hot swappable 48-port/72-port ADSL2/ADSL2+ Annex A line card
- Maximum transmission rate up to 25 Mbps/ 2.4 Mbps for ADSL2+
- One mini-RJ11 console port
- One gigabit backplane
- Support G.992.3 and G.992.5 spectral mask
- Support EOC and overhead channel access defined in G.992.3 and Rec.G.997.1
- Support the latency path function specified in G.992.3 and G.992.5
- Support Annex L and Annex M specified in G.992.3 and G.992.5
- Support loop diagnostic function specified in G.992.3 and G.992.5
- Support the power management capability specified in G.992.3 and G.992.5
- Support the capability of the seamless rate Adaptation (SRA) on-line configuration specified in G.992.3 and G.992.5
- Support ADSL2+ 2-port bonding (G.998.1)

ALC1248G-53

- Hot swappable 48-port ADSL2/ADSL2+ Annex B line card
- Support Annex M and Annex L specified in G.992.3 and G.992.5
- Maximum transmission rate up to 25 Mbps/ 2.4 Mbps for ADSL2+
- One mini-RJ11 console port
- One gigabit backplane

SLC1248G-22

- Hot swappable 48-port SHDSL/SHDSL.bis line card
- Support ETSI TS 101 524 V 1.2.1, ITU-T G.991.2, ITU-T G.991.2.bis
- ATM-based multi-pair bonding (G.998.1) up to 8 ports
- Symmetric transmission rate of 5.69 Mbps/port
- One mini-RJ11 console port
- One gigabit backplane

VLC1324G-51/VLC1324G-53/ VLC1348G-51

- Hot swappable 24-port/48-port VDSL2 line card over POTS and over ISDN
- Support G.993.2, G.994.1, G.997.1
- Maximum transmission rate up to 100 Mbps/ 50 Mbps
- One mini-RJ11 console port
- Two gigabit backplane
- Support VDSL2 profiles 8a, 8b, 8c, 8d, 12a, 12b and 17a
- Support frequency allocation bandplan 998 and 997
- Support U0 band, customer PSD, RFI notch, single latency in PTM mode and INP
- Support UPBO and DPBO, reed solomon and trellis coding
- Support ADSL fall back with ADSL/ADSL2/ ADSL2+ CPE in Annex A, M, L modes
- Support IEEE 802.1ag Connectivity Fault Management (CFM)

ELC1220G-55

- Support 20 open slots for Fast Ethernet SFP (100Base-FX/BX/LX/EX)
- One mini-RJ-11 console
- Aggregates layer-2 traffic from Fast Ethernet subscribers to the chassis system
- Support multicast VLAN, IGMP snooping, IGMP filter and static multicast functions for MoD services
- Support DHCP relay, option82 and snooping functions
- Support ACL, anti-IP address spoofing and anti-MAC address spoofing security functions

MSC1024G/MSC1224G

- Failover-enabled network termination card
- Embedded 48G, non-blocking full duplex switching fabric
- MSC1024G supports eight 1G Ethernet uplink & subtending ports:
  - 4 optical fiber port (SFP modules) for uplink traffic aggregation
  - 2 100/1000Base-Tx interface module for subtending
  - 2 1000 Mbps interface modules (combo design, SFP + copper) for dynamic adjustment about subtending and uplink aggregation, depending on the practical deployment requirement
- MSC1224G supports two 10G (XFP) and six 1G uplink/subtending interfaces:
  - 2 optical fiber port (SFP modules) for uplink traffic aggregation
  - 2 100/1000Base-Tx interface module for subtending
  - 2 1000 Mbps interface modules (combo design, SFP + copper) for dynamic adjustment about subtending and uplink aggregation, depending on the practical deployment requirement
- One RS232 (DB-9) serial console port
- One 10/100M out-of-band Mgmt interface
- 16 Gigabit Ethernet (SerDes) backplane interface
- 16K MAC addresses
- 512 L2 multicast groups (1K scalability)
- 4K VLANs

VOP1248G-61

- 48-port VoIP line card
- Support H.248 version 2 or SIP singling protocol
- Compatible CPE including POTS phone, Fax, analog modem and pay phone
- Support G.711 a/μ, G.726, G.729 a/b G.723.1
- 20K Business Hour Call Attempts (BHCA)
- Configurable jitter buffer
- Support the generation of dial tone, second dial tone, ringing tone (ring-back tone), busy tone, off-hook warning tone
- Support call waiting, call hold, call transfer, return and call back on busy
- Emergency call local route
- Local dial available
- MLT (Metallic Loop Testing for subscriber lines) and GR-909 loop diagnostic

IMA1408G-81

- Hot swappable 8-port E1 IMA card, 8 groups per card
- Support G.703, G.704
- Full-duplex bandwidth up to 16M
- One mini-RJ11 console port
- Two gigabit backplane
- Support RFC1483/1577/2364/2684
- Support ATM Forum Rec UNI 3.0, UNI 3.1, UNI 4.0
- Support ITU-TI.361, I.371, G.804

VLC1424G-56

- Hot swappable 24-port VDSL2 line card
- Support G.993.2, G.994.1, G.997.1
- Maximum transmission rate up to 100 Mbps/100 Mbps
- One mini-RJ11 console port
- Two gigabit backplane
- Support VDSL2 profiles 8a, 8b, 8c, 8d, 12a, 12b, 17a and 30a
- Support frequency allocation bandplan 998 and 997
- Support customer PSD, RFI notch, single latency in PTM mode and INP
- Support trellis coding
- Support IEEE 802.1ag Connectivity Fault Management (CFM)

Physical Specifications

IES-6000M

- Dimensions: 439.2 (W) x 280.5 (D) x 543.3 (H) mm
- Weight: 15 Kg

ALC1272G-51

- Dimensions: 390.6 (W) x 240 (D) x 13.8 (H) mm
- Weight: 0.7 Kg

ALC1248G-51

- Dimensions: 390.6 (W) x 240 (D) x 13.8 (H) mm
- Weight: 0.5 Kg

ALC1248G-53

- Dimensions: 390.6 (W) x 240 (D) x 13.8 (H) mm
- Weight: 0.5 Kg

SLC1248G-22

- Dimensions: 390.6 (W) x 240 (D) x 13.8 (H) mm
- Weight: 0.5 Kg

VLC1324G-51/VLC1324G-53

- Dimensions: 390.6 (W) x 240 (D) x 13.8 (H) mm
- Weight: 1 Kg

VLC1348G-51

- Dimensions: 390.6 (W) x 240 (D) x 13.8 (H) mm
- Weight: 1.3 Kg

ELC1220G-55

- Dimensions: 390.6 (W) x 240 (D) x 13.8 (H) mm
- Weight: 0.5 Kg

MSC1024G

- Dimensions: 390.6 (W) x 240 (D) x 13.8 (H) mm
- Weight: 0.6 Kg

MSC1224G

- Dimensions: 390.6 (W) x 240 (D) x 13.8 (H) mm
- Weight: 0.8 Kg

VOP1248G-61

- Dimensions: 390.6 (W) x 240 (D) x 13.8 (H) mm
- Weight: 0.5 Kg

IMA1408G-81

- Dimensions: 390.6 (W) x 240 (D) x 13.8 (H) mm
- Weight: 0.8 Kg

VLC1424G-56

- Dimensions: 390.6 (W) x 240 (D) x 13.8 (H) mm
- Weight: 1 Kg

Environmental Specifications

- Operating temperature: 0°C ~ 50°C
- Storage temperature: -40°C ~ 70°C
- Humidity: 10% ~ 95% (non-condensing)
- Power supply: -48 V DC
- Full load power consumption:
  - IES-6000M: 70 W
  - ALC1272G-51: 95 W
  - ALC1248G-51/53: 69 W
  - SLC1248G-22: 47 W
  - VLC1324G-51/VLC1324G-53: 47.5 W
  - VLC1348G-51: 88.1 W
  - ELC1220G-55: 40 W
  - MSC1024G: 20 W
  - MSC1224G: 33 W
  - VOP1248G-61: 84 W
  - IMA1408G-81: 32 W
  - VLC1424G-56: 66 W

Certification

- CE
- UL 60950, CSA 60950
- FCC part 15 class A
- ITU-T K.20
- ETSI 300 019
- EN55022 class A
- EN55024 class A
- ETSI 300 386

System Architecture

IES-6000M

Control Card

MSC1024G

MSC1224G

E1 IMA Card

IMA1408G-81

ADSL Line Card

ALC1248G-51

ALC1248G-53

ALC1272G-51

Ethernet Line Card

ELC1220G-55

G.SHDSL Line Card

SLC1248G-22

VDSL2 Line Card

VLC1324G-51

VLC1324G-53

VLC1348G-51

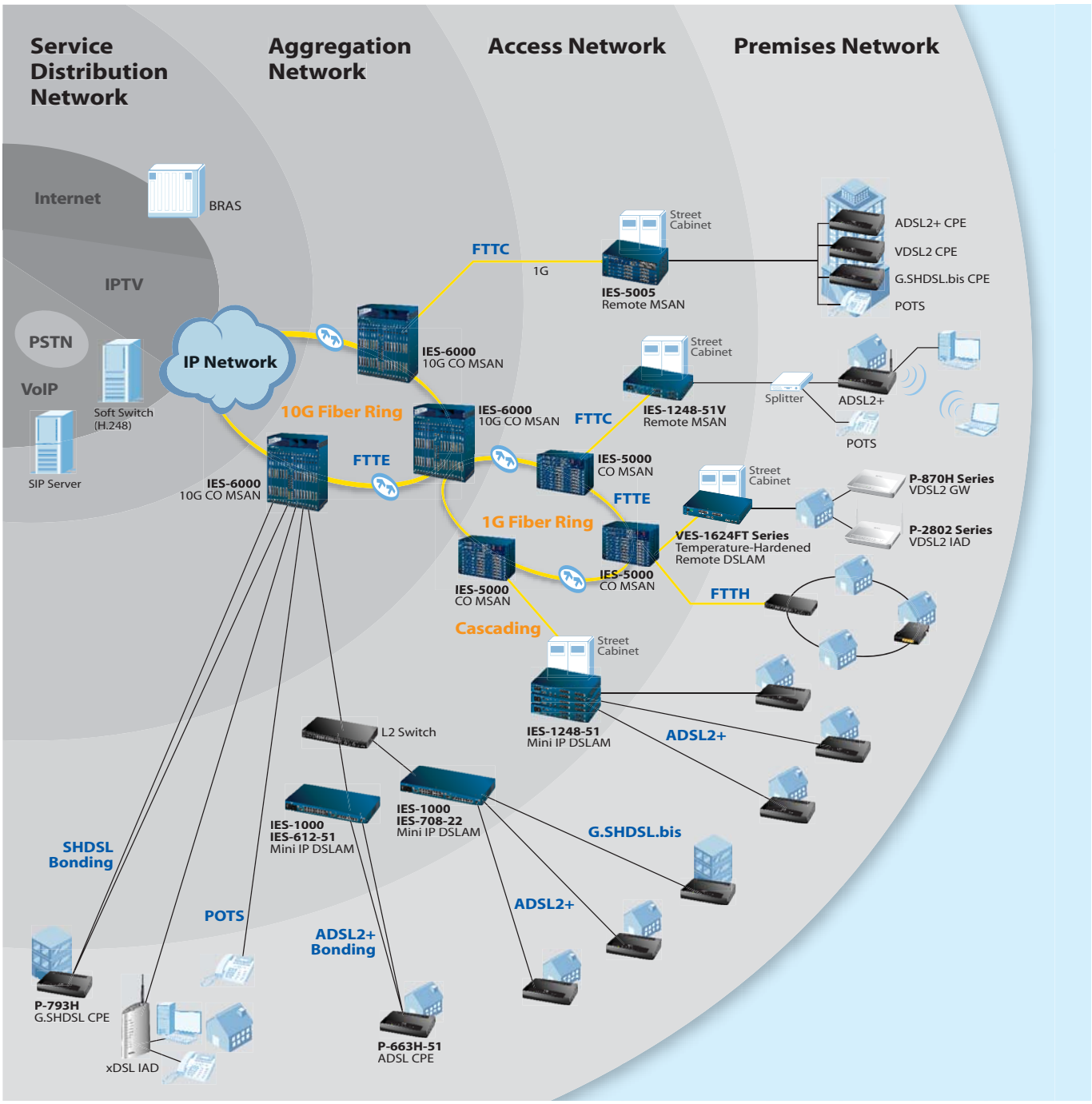
VLC1424G-56

VoIP Line Card

VOP1248G-61

Application Diagram

Network Topology for MSAN/DSLAM Products



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